

Extra Practice for Sample Final Questions:

1)

You draw a single card from a standard 52-card deck. If it is an ace, you win \$100. Otherwise, you get nothing. What is the expected value of the game to you?

Find solution as Example 3 from 8.5 notes

After paying \$3 to play, a single fair die is rolled, and you are paid back the number of dollars corresponding to the number of dots facing up. For example, if the die has 5 turned up, \$5 is returned to you for a net gain, or payoff, of \$2. If a 2 turns up, \$2 is returned for a net gain of - \$1, and so on. What is the expected value of the game? Is the game fair?

Find solution as example 5 from 8.5 notes

2) Let $A = \{3, 6, 9\}$, $B = \{3, 4, 5, 6, 7\}$, $C = \{4, 5, 7\}$, and $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$. Find :

- | | | |
|----------------------|------------------------|------------------------|
| a) $A \cup B$ | b) $A \cap C$ | c) $A \cap B$ |
| d) B' | e) $(A \cup B)'$ | f) $B' \cup A$ |
| g) $(A \cap B)'$ | h) $A \cap B \cap C$ | i) $A \cap B'$ |
| j) $A \cup B \cup C$ | k) $(A \cap B) \cup C$ | l) $(A \cup B) \cap C$ |

k) Draw a Venn Diagram, fill it with elements and use it to check your answers to parts a) through j)

Find solution as Example 7 from 7.2 notes

3) Draw a 3-set Venn Diagram and shade the regions:

- | | |
|------------------------|------------------------|
| a) $A \cap B$ | b) $A \cap B \cap C$ |
| c) $A \cup B$ | d) $A \cup B \cup C$ |
| e) $(A \cup B) \cap C$ | f) $(A \cap B) \cup C$ |
| g) $(A \cap B)'$ | |

Find solution as Example 6 from 7.2 notes

4) License plates in Maryland consist of 3 letters of the alphabet followed by 3 digits.

- How many possible license plates are there?
- Of these, how many will have all their digits distinct (no repeats)?
- How many will have the letters AND the digits distinct (no repeats)?

Find Solution as Example 9 from 7.3 notes

5) Compute/simplify. Show work. a) $8!$ b) $\frac{9!}{7!}$ c) $\frac{44!}{4!40!}$ d) $(4 + 1)!$ e) $\frac{6!}{0!3!}$ f) $\frac{20!}{(20-5)!}$ g) $\frac{(n+1)!}{(n-2)!}$

Find Solution as Example 1 from 7.4 notes

6) List the number of items from:

(a) Selecting 3 cards *in order* (without replacement) from a deck of 52 cards

(b) Selecting 2 cards (without replacement) in *any order* from a deck of 52 cards

Find solution as Example 8 from 7.4 notes

7) A company has 6 seniors and 4 junior officers. It wants to form an ad hoc legislative committee. In how many ways can a 4-officer committee be formed so that it is composed of

(a) Any 4 officers?

(b) 4 senior officers?

(c) 3 senior officers and 1 junior officer?

(d) 2 senior officers and 2 junior officers?

(e) At least 2 senior officers? Note: Look at calculations from parts a) –d).

Find Solution as Example 13 from 7.4 notes

You have 8 marketing books and 6 finance books. Say you want to arrange them on the shelf, but only have room for 7. You will put the marketing books in the first 4 positions, and the finance books in the last 3 positions. How many different ways can this be done?

Find solution as Example 12 from 7.4 notes

8) Given $P(E) = 0.7$, $P(F) = 0.8$, $P(E \cap F) = 0.6$, find:

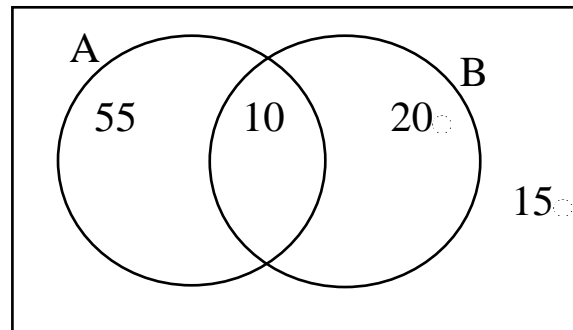
(a) $P(E \cup F)$

(b) $P(E | F)$

(c) $P(F | E)$

Find solution as Example 3 from 8.3 notes

Refer to the Venn diagram to the right for events A and B in an equally likely sample space S. Find: the following. Give answer as both a reduced fraction and to 2 decimal places.



(a) $P(A \cup B)$

(b) $P(A \cap B)$

(c) $P((A \cap B)')$

Find solution as Example 4 from 8.2 notes

9) The following represents data from a survey of 594 consumers testing a new deodorant.

| | Like Deodorant (E) | Did not like Deodorant (F) | No Opinion |
|---------------|--------------------|----------------------------|------------|
| Group I (G) | 180 | 60 | 20 |
| Group II (H) | 110 | 85 | 12 |
| Group III (K) | 55 | 65 | 7 |

What is the probability a consumer (give answers as reduced fractions)

a) does not like the deodorant given the customer is from Group I?

b) does not like the deodorant

b) $P(E \cap G)$

d) $P(H | E)$

Find solution as example 6 from 8.3 notes

10) Suppose in a group of 1000 people, there are 70 accountants, 520 females, and 40 female accountants. A person is chosen at random, and we are told the person is female. What is the probability that the person is an accountant, given that the person is female?

Use the events: E = the person is an accountant
 F = the person is a female

Create the Venn Diagram for this scenario:

find $P(E | F)$:

Find solution as Example 3 from 8.3 notes

11) A box has 4 white, 1 green, and 3 yellow balls in it. Two balls are drawn one at a time without replacing the first ball before the second ball is drawn. Use the tree diagram to find the following probabilities:

a) $P(\text{first is white and second is yellow}) =$ (b) $P(\text{second is yellow given that first is white}) =$

Find solution as Example 15 from 8.3 notes

A box has 4 white, 1 green, and 3 yellow balls in it. Two balls are drawn one at a time replacing the first ball before the second ball is drawn. Use the tree diagram to find the following probabilities.

(a) $P(\text{first is white and second is yellow}) =$ (b) $P(\text{second is yellow given that first is white}) =$

Find solution as Example 16 from 8.3 notes

12) Two cards are drawn one at a time (without replacement) from a deck of cards. What is the probability the first card is a diamond, and the second card is red?

Find solution as Example 7 from 8.3 notes

13) A new skin cream can cure skin infection 90% of the time. If 5 randomly selected people with skin infections use this cream, what is the probability:

(a) all 5 are cured? (b) none are cured?

Find solution as Example 13 from 8.3 notes

14) A pitcher gives up a hit on average of once every 5 pitches. If 9 pitches are thrown, what is the probability:

- a) Exactly 3 pitches result in hits? Round all to at least 4 decimal places.
b) No pitch results in a hit?
c) 8 or more result in hits? d) No more than 7 pitches result in hits?

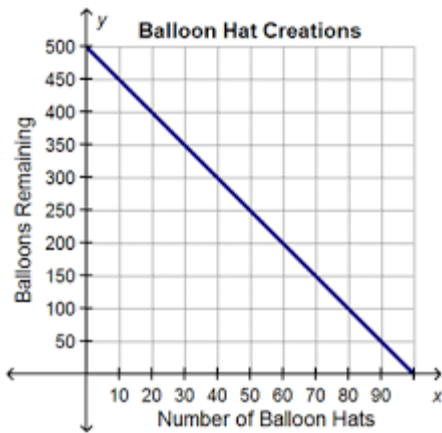
Find solution as Example 3 from 10.4 notes

15) A health clinic tests residents of a community for cancer. Exam results are positive if malignancy is suspected and negative if there are no indications of malignancy. If a person has cancer (C), the probability of a positive is 0.98. If a person does not have cancer (N), probability of a positive is 0.15.

If 5% of the community has cancer, what is the probability of a person not having cancer if the exam is positive?

Find solution Example 3 from 8.4 notes

16)



- write the linear equation for the graph on the left.
- What is the initial number of balloons?
- Using the equation**, determine the number of balloons remaining if 54 balloon hats have been made. Does this value appear to match up with the graph? Circle the approximate value on the graph.
- using the equation**, determine the number of balloon hats that have been made if there are 160 balloons remaining. Does this value appear to match up with the graph. Put a box around the approximate value on the graph.

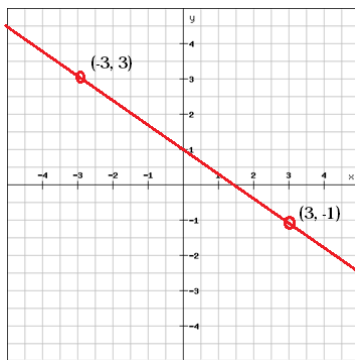
Find solution as Example 3 from 1.3 notes (Introduction to lines)

The management of a company that manufactures skateboards has total cost of \$300 per day at 0 output per day (fixed costs) and total costs at \$4300 per day at an output of 100 skateboards per day. Assume that cost C is linearly related to the output x .

- Find the equation of the line relating output to cost.
- Determine how many skateboards can be manufactured at a cost of \$2500 a day. Use your equation.

Find solution as Example 10 from 1.2 notes

17) Find the equation of the line

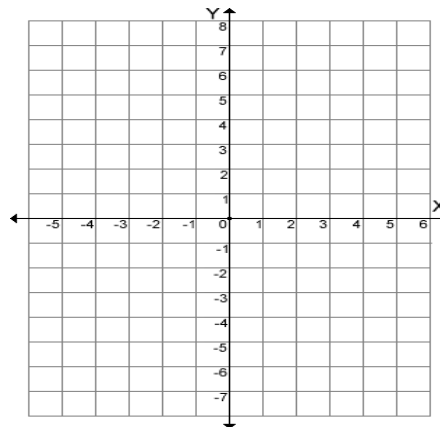


Find solution as Example 8 from 1.2 notes

Graph and state the slope

a) $y = -3$

b) $x = 2$



Find solution as Example 4 from 1.2 notes

18) Appropriate doses of medicine for both animals and humans are often based on body surface area (BSA).

Since weight is much easier determined than BSA, veterinarians use the weight of an animal to estimate BSA.

The following linear equation expresses BSA for canines in terms of weight:

$$a = 16.12w + 375.6$$

where a is BSA in square inches and w is weight in pounds. Interpret the slope of the BSA equation.

Find solution as Example 2d) from 1.3 notes

19) A newly-launched candy company has daily fixed costs of \$300. Each pound of candy produced costs \$1 and is sold for \$2.

- Find the cost C of production for x pounds of candy.
- Find the revenue R from selling x pounds of candy.
- What is the break-even point? (i.e. where does cost equal revenue?) Give in point form (x,y) .
- Graph C and R , and label the break-even point. For what value of x does a loss occur? For what value of x does a profit occur?

Find solution as Example 4 from 1.1 notes

20)

Find an equation of the line passing through the given points. $(5,-2)$ and $(-3,14)$

- Write the equation in slope-intercept form (if possible).
- Write the equation in standard form

Find solution as Example 7 from 1.2 notes

21) Find the x and y - intercepts and graph. Then state the slope $5y-2x=12$

Find solution as Example 4 from 1.2 notes

22)

Set up a system of linear equations. **You don't need to solve:**

A patient on a brown rice and skim milk diet is required to have at least 800 calories at and least 32 grams of protein per day. Each serving of brown rice contains 200 calories and 5 grams of protein. Each serving of skim milk contains 80 calories and 8 grams of protein. Set up a system of inequalities. Use x =# of servings of rice and y =# of servings of skim milk. Then, shade the feasible region and list the corner points.

Find solution as "setting up systems of inequalities -Sec. 5.2 continued"

Set up a system of linear equations. **You don't need to solve:**

A manufacturing plant makes two types of inflatable boats- a two person boat and a 4-person boat. Each two person boat requires 0.9 labor-hour in the cutting department and 0.8 labor-hour in the assembly department. Each 4 person boat requires 1.8 labor-hours in the cutting department and 1.2 labor-hours in the assembly department. The maximum labor-hours available each month in the cutting and assembly departments are 864 and 672, respectively. If x two-person boats and y four-person boats are manufactured each month, write a system of linear inequalities that reflects the conditions indicated.

Find solution as "setting up systems of inequalities -Sec. 5.2 continued"

Set up the LP programming problem. **You do not need so solve:**

Nutt's Nuts has 75 lbs. of cashews and 120 lbs. of peanuts. These are to be mixed in 1 lb. packages as follows:

- A low-grade mix that contains 4 oz of cashews and 12 oz of peanuts
- A high-grade mix that contains 8 oz of cashews and 8 oz of peanuts

Let x represent the number of packages of low-grade mix, and y represent the number of packages of high-grade mix.

Now suppose we know the profit will be on each type of mix:

- \$0.25 on each package of low-grade mix
- \$0.45 on each package of high-grade mix

How many packages of each type of mix should be prepared to maximize profit?

Find solution as Example 1 from 5.3 notes

Formulate an LP (Linear Programming) model for the following problem. Don't solve. A toy manufacturer makes two different kinds of model cars: the Porsche and the Ferrari. They are made of steel and aluminum. Each Porsche requires 1 unit of steel and 2 units of aluminum, each Ferrari requires 3 units of steel and 4 units of aluminum. The company has 5,500 units of steel and 10,000 units of aluminum available. The number of Porsches made must be at least twice the number of Ferraris made. The total number of model cars made must be at least 1,000. If \$10 profit is made on each Porsche and \$15 on each Ferrari, how many of each model car should the toy manufacturer make in order to maximize its profit?

Solution is example 5 from 5.3 notes

23)

Write the solution to the system of equations, use a parameter t if needed.

$$\begin{array}{l}
 \text{a) } \left[\begin{array}{ccc|c} 1 & -1 & 0 & -2 \\ 0 & 1 & 2 & 6 \\ 0 & 0 & 1 & 2 \end{array} \right] \quad \text{b) } \left[\begin{array}{ccc|c} 1 & -1 & 0 & -2 \\ 0 & 1 & 2 & 6 \\ 0 & 0 & 0 & 0 \end{array} \right] \quad \text{c) } \left[\begin{array}{ccc|c} 1 & -1 & 0 & -2 \\ 0 & 1 & 2 & 6 \\ 0 & 0 & 0 & 2 \end{array} \right] \quad \text{d) } \left[\begin{array}{cccc|c} 1 & 0 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 & 2 \\ 0 & 0 & 1 & 0 & -7 \\ 0 & 0 & 0 & 1 & 4 \end{array} \right]
 \end{array}$$

Solution is last example in 4.3 notes

24)

$$\text{Minimize } P = x + 2y \quad \text{Subject to the constraints } \begin{cases} 2x + 4y \geq 3 \\ x + y \geq 1 \\ x \geq 0 \\ y \geq 0 \end{cases} . \text{ Sketch own feasible region.}$$

Solution is example 4 in 5.3 notes

Find the maximum and minimum values of $P = x + 5y$ (*objective function*)

$$\text{Subject to the constraints } \begin{cases} x + 4y \leq 12 \\ x \leq 8 \\ x + y \geq 2 \\ x \geq 0 \\ y \geq 0 \end{cases}$$

Solution is example 5 in 5.3 notes

25) Suppose that the supply and demand for printed baseball caps for a particular week are

$$p = 0.4q + 3.2 \quad \text{Price-supply equation}$$

$$p = -1.9q + 17 \quad \text{Price-demand equation}$$

a) Find the supply and demand (to the nearest unit) if baseball caps are \$4 each. Discuss the stability of the baseball cap market at this price level.

b) Find the supply and demand (to the nearest unit) if the baseball caps are \$9 each. Discuss the stability of the baseball cap market at this price.

c) Find the equilibrium price and quantity (notice this is also solving a system by substitution!)

Find solution as Example 4 from 4.1 notes

26) For a particular event, 651 tickets were sold for a total of \$1622. If students paid \$2 per ticket and nonstudent paid \$4 per ticket, how many tickets were sold?

Find solution as Example 5a from 4.1 notes

Set up system only, you don't need to solve: Suppose that a store has three sizes of cans of nuts.

*The large size contains 2 pounds of peanuts, 2 pound of cashews

*The mammoth size contains 1 pound of walnuts, 6 pounds of peanuts, and 2 pounds of cashews

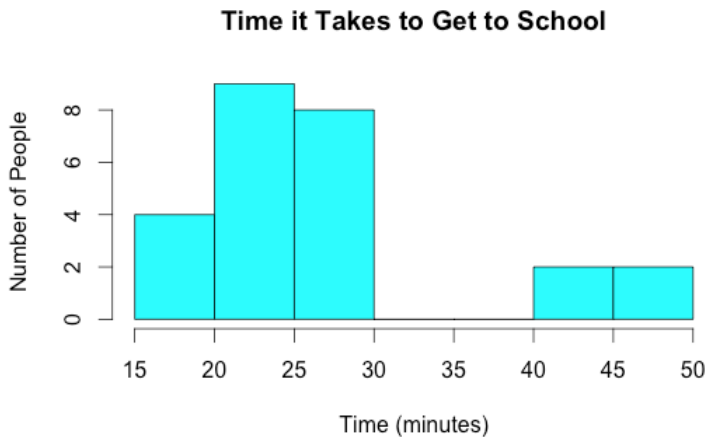
*The giant size contains 1 pound of walnuts, 4 pounds of peanuts, and 2 pounds of cashews.

Suppose that the store receives an order for 5 pounds of walnuts, 26 pounds of peanuts, and 12 pounds of cashews. How can it fill this order with the given sizes of cans?

Find solution as example 4 of 4.2 notes

27)

Find the mean, interval for median and interval for mode



Find solution as Example 5b) of 10.2 notes

Find the mode:

a) 2, 1, 2, 1, 1, 5, 1, 9, 4

b) 2, 5, 1, 4, 9, 8, 7

c) 8, 2, 6, 8, 3, 3, 1, 5, 1, 8, 3

d) A, A, B, C, D, E, E, A

Find Solution as example 4 of 10.2 notes

Find the median: 7, -5, 0, -2, 3, -6

Find solution as example 3b of 10.2 notes

28)

a) Is it possible to create a data set with 4 data points that has a standard deviation of 0?

b) Consider the simple data set {1, 6, 7, 2, 5}. What do you think happens to the standard deviation when 7 is replaced with a 12?

Find solution as example 3 of 10.3 notes

29) Corporation Revenues, 2015

| Corporation | Revenue (billion \$) |
|--------------------|-----------------------------|
| Walmart | 482 |
| ExxonMobil | 246 |
| Apple | 234 |
| McKesson | 192 |

a) Graph the data in the f table using a horizontal bar graph.

b) What percent of the total revenue of these companies came from Apple in 2015?

Find solution as example 2 of 10.3 notes

30) Graph the data in the following table using a vertical bar graph.
Gross Domestic Product (GDP)

| Year | GDP (trillion \$) |
|-------------|--------------------------|
| | |
| 1975 | 5.49 |
| 1985 | 7.71 |
| 1995 | 10.28 |
| 2005 | 14.37 |

b) What is the change in GDP from 1975 to 1985?

c) What is the percent change in GDP from 1975 to 1985? Round to the nearest hundredth of a %

d) In which 10 year span was the percent increase of GDP the most? Is that the same 10 year span where the GDP increased the most?

Find solution as example 1 of 10.1 notes